Grid Director 4036E

Installation Manual

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Preface

About this Manual

This manual provides installation instructions for the high-bandwidth, low-latency scalable InfiniBand Mellanox Grid Director 4036E with 32 QDR and 2x10 GbE ports. It includes the product specifications, unpacking and installation information, unit power up, and initiation and troubleshooting procedures.

> Refer to the official and latest product release notes for last-minute updates.
>
> Technical support may be obtained directly from:
>
> - Your regional distributor from whom this product was ordered
> - Your OEM customer representative
>
> For further information and assistance, go to
> http://www.mellanox.com/content/pages.php?pg=support_index.

Audience

This manual is for system administrators responsible for installing the Grid Director™ 4036E. We assume that you are familiar with the concepts and terminology of InfiniBand, Ethernet, and local area networking.

Related Documentation

For additional information, refer to the following documents:

- Grid Director Family Getting Started Guide [LIT-00037]
- Grid Director Family User Manual [DOC-00785]
- Grid Director Family Release Notes [DOC-00962]
- Regulatory and Compliance Reference Guide [DOC-00859]

Document Conventions

The following lists conventions used in this document.

> **NOTE:** Identifies important information that contains helpful suggestions.

> **CAUTION:** Alerts you to the risk of personal injury, system damage, or loss of data.

> **WARNING:** Warns you that failure to take or avoid a specific action might result in personal injury or a malfunction of the hardware or software. Be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents before you work on any equipment.

Typography

The following table describes typographical conventions in Mellanox documentation. All terms refer to isolated terms within body text or regular table text unless otherwise mentioned in the Notes column.

Term, Construct, Text Block	Example	Notes
File name, pathname	*/opt/ufm/conf/gv.cfg*	
Console session (code)	`-> flashClear <CR>`	Complete sample line or block. Comprises both input and output. The code can also be shaded.
Linux shell prompt	`#`	The "#" character stands for the Linux shell prompt.
Mellanox CLI Guest Mode	`Switch >`	Mellanox CLI Guest Mode.
Mellanox CLI admin mode	`Switch #`	Mellanox CLI admin mode
String	`< > or []`	Strings in < > or [ ] are descriptions of what will actually be shown on the screen, for example, the contents of <your ip> could be 192.168.1.1
Management GUI label, item name	**New Network, New Environment**	Management GUI labels and item names appear in bold, whether or not the name is explicitly displayed (for example, buttons and icons).
User text entered into Manager, e.g., to assign as the name of a logical object	**"Env1", "Network1"**	Note the quotes. The text entered does not include the quotes.

1   Introduction

1.1   Grid Director 4036E Overview

The Mellanox Grid Director 4036E is a high performance, low latency and fully non-blocking InfiniBand switch, which includes a built-in low latency Ethernet gateway for bridging traffic to and from Ethernet-based networks or storage. With thirty-four 40 Gbps InfiniBand ports (delivering 2.72 Tbps), less than 100 nanoseconds of port-to-port latency, and two 1/10Gb Ethernet ports bridging traffic in less than two microseconds, I/O bottlenecks are removed making applications operate at maximum efficiency.

The Grid Director 4036E is a self-contained full solution including an InfiniBand switch, an embedded subnet manager, and a built-in, hardware-based (cut-thru) low latency Ethernet gateway in a compact 1U device.

The following figure shows the front view of a Grid Director 4036E Unit.

Figure 1: Grid Director 4036E Front View

The following figure shows the rear view of a Grid Director 4036E Unit.

Figure 2: Grid Director 4036E Rear View

1.2   Grid Director 4036E Features

The main features of the 4036E gateway include:

- 19" rack mountable chassis, 1U height, configurable with redundant power supplies and fan units

- Aggregate data throughput: 2.72 Tb/s (QDR), 1360 Gbps (DDR) or 680Gbps (SDR)
- 34 QDR (40 Gbps) ports and two 1/10 GbE SFP+ ports in a 1U switch.
- Ultra-low latency:
  - less than 100 nanoseconds between InfiniBand ports
  - less than two microseconds between InfiniBand and Ethernet
- Virtual lanes: 8 data and 1 for management
- MTU: 4096 Bytes (max.)

Additional features include:

- Low latency, hardware-based (cut-thru) bridging between InfiniBand and Ethernet
- Provides high performance connectivity to Ethernet-based services and resources
- Consolidates network and I/O infrastructure
- Plug & play, standards-based protocol bridging with zero configuration required on the Grid Director 4036E itself or on the servers
- Embedded subnet manager
- Transparent mapping between Ethernet VLANs and InfiniBand partitions to ensure continuity of security and service levels
- Accelerating IP multicast over InfiniBand using hardware-based multicast
- Flow control support over both InfiniBand and Ethernet links for efficient handling of congestion
- Layer 2/3/4-based packet filtering and classification
- Link aggregation (LAG) between Ethernet ports
- Aggregation of Ethernet ports from multiple gateways for scalability or redundancy purposes
- Designed to provide high MTBF
- Redundant, hot-swappable power supplies
- Supported cables: InfiniBand QSFP and Ethernet 10G/1G Copper or Optical
- Built-in cable detection and optimization to achieve the longest available cable distance and highest performance.
- Built-in high availability.

1.3   Management

The 4036E Gateway includes smart device management that provides a simple Command Line interface for deploying, troubleshooting, maintaining and upgrading the switch. You can use the CLI to perform routine tasks such as monitoring the switch operation or upgrade the software and firmware.

The 4036E Gateway comes with an onboard subnet manager, enabling simple, out-of the-box fabric bring-up for small to medium clusters.

Refer to the *Grid Director 4000 Family User Manual* for details on 4036E software requirements and configuration.

2   Unpacking

2.1   Overview of Unpacking the 4036E

This chapter provides step-by-step instructions for the packing and unpacking the 4036E Gateway.

2.2   Package Contents

Mellanox delivers the 4036E Gateway in a cardboard box. The gateway comes with one or two pre-installed hot-swappable power supplies (according to configuration) and one hot-swappable fan unit.

Additional components include:

- Two power cords.

- Rail kit (refer to Rail Kit (KIT-00008) (on page 14) for details).

- A multipurpose console cable kit (Mng). Refer to Multipurpose (Mng) Console Cable Kit (on page 14) for details.

- Grid Director Getting Started Guide (hard copy).

- A product CD containing Grid Director 4036E documentation and software.

- ➢ *Before You Begin*

- Before unpacking, make sure that the box is sealed and undamaged.

- Before beginning the installation of the Grid Director 4036E, verify that the package contains all the items, as detailed in the Getting Started Guide. For alist of parts delivered with the product, see Ordering Options (on page 19).

- Check for loose parts or any visible damage to the contents. Notify your supplier if you detected damaged or missing parts.

2.3   Unpacking the Grid Director 4036E

This section details the Grid Director 4036E package contents and provides instructions on how to unpack the chassis.

➢ *To unpack the Grid Director 4036E, perform the following steps:*

1. Open the box and check that it contains the items as shown in the following figure.

2. Remove the box containing the Rail Kit, the Power Cords, and the multipurpose console cable kit (Mng).

3. Remove the Getting Started Guide.

4. Remove the top foam.

5. Carefully remove the Grid Director 4036E. Use the dedicated niche to lift the switch, as shown in the following figure.

6. Remove the protective antistatic bag from the Grid Director 4036E.

2.4 Rail Kit (KIT-00008)

The rail kit entails:

- 2 Short Brackets (Angular bracket mount)
- 2 Long Brackets (Left and Right)
- 2 mounting bars
- 14 pan head Philips screws, 8-32 x 1/4" with tooth lock washers and nylon patch.

Figure 3: Fixed Rail (KIT-00008)
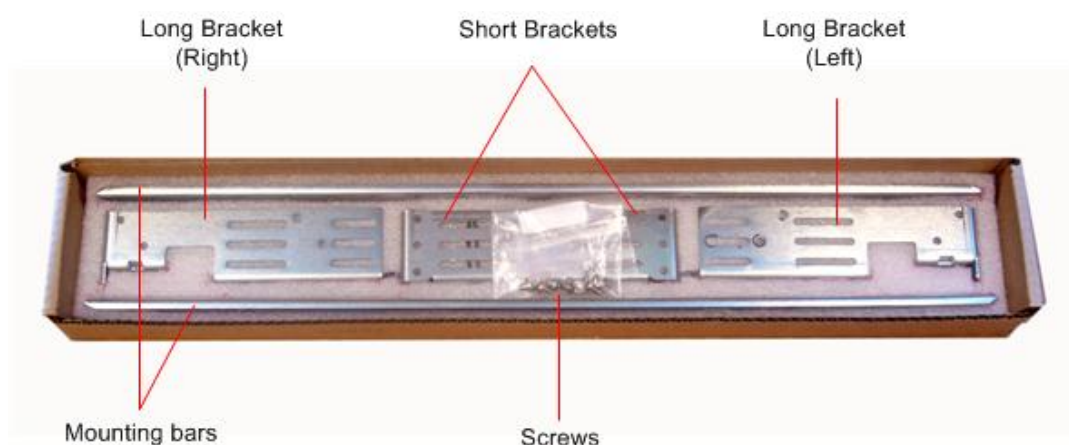
2.5 Multipurpose (Mng) Console Cable Kit

The multipurpose console kit (Mng) contains:

- RJ45 to RJ45 cable
- A RJ45 to DB-9 cross-adaptor for RS-232 console connection (CLI) (the DB-9 adaptor has a number 26 printed on it, which means that pins 2 and 6 are crossed)
- A RJ45 to DB-9 adaptor for RS-232 console connection.

Figure 4: Console Cable Kit (Mng)

2.6 Packing the Grid Director 4036E

You may need to move the Grid Director 4036E to a different location or send it for repair; should this be necessary, pack the equipment as described below.

➢ *To pack the Grid Director 4036E, perform the following steps:*

1. Unmount the Grid Director 4036E from the rack.

2. Disassemble the rail brackets and pack the parts in the rail kit box.

3. Insert the Grid Director 4036E into its antistatic bag.

4. Carefully lift the switch, making sure that the bottom of the switch is facing down.

   Tip: you can easily identify the bottom of the switch since it has a certification label.

5. Insert the switch into the cardboard box and place it on the bottom foam.

6. Place the top foam on top of the switch.

7. Slide the rail kit box in the dedicated niche alongside of the switch. When sending the switch for repair without the rail kit, secure it by filling this niche with a filler. This will protect the switch and prevent it from moving during transportation.

8. Place the Getting Started Guide and the Multipurpose Console Kit (Mng) **on top** of the top foam.

9. Place the power cords in the allocated spaces in the foam.

10. Use tape to close the box and verify that the box is securely closed.

3 Getting Started

3.1 Getting Started Overview

The following sections provide a detailed description of the front and rear panels of the Grid Director 4036E.

3.2 Front Panel Description

This section details the front panel Grid Director 4036E.

Figure 5: Grid Director 4036E Front Panel
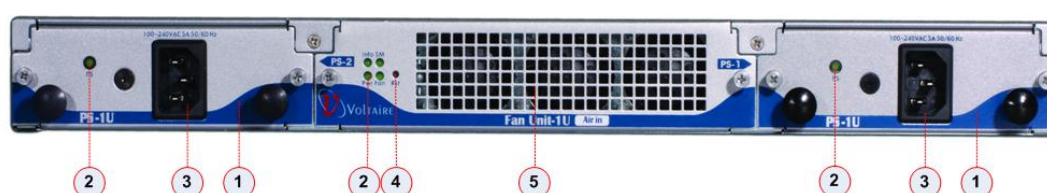
The following table details Grid Director 4036E front panel components.

Table 1: Grid Director 4036E Front Panel Components

Item	Component	No. of components	Description
1	Power Supply (PSU)	1 or 2 (according to configuration)	The swappable power supply modules provide the Grid Director 4036E DC supply. You can install one or two AC/DC 100-240Vac to 12Vdc 350W hot-swappable redundant power supplies in the Grid Director 4036E. The power supply has an IEC Power Receptacle that supplies the chassis input voltage, as indicated in the power supply characteristics in Power Specifications - Power Supply Module (on page 22)
2	LEDs (Status Indicators)	5	Front panels LEDs: • System Power • Info • SM • Fan Unit • Power Supply • I/O LED Refer to LED Indicators (on page 23) for the list of LEDs and their descriptions.
3	AC power Inlet	2	Power Supply power inlet type 6A type C14.
4	Reset Button	1	When pressed for more than 1 second, resets the entire unit.
5	Fan Unit	1	Hot swappable fan unit hosting three internal fans for high availability. Auto-heat sensing allows for silent fan operation.

Item	Component	No. of components	Description
			Two options are available: • Front-to-rear cooling (labeled as "Air-in") • Rear-to-front cooling (labeled as "Air-out")

3.3 Rear Panel Description

This section details the rear panel of a Grid Director 4036E.

Figure 6: Grid Director 4036E Rear Panel
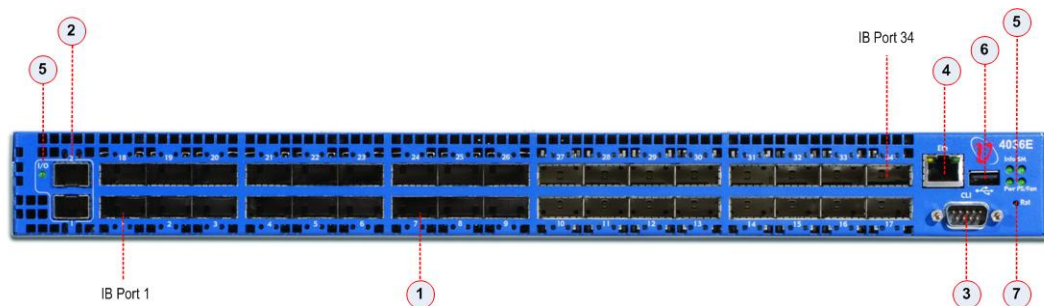
The following table details Grid Director 4036E rear panel components.

Table 2: Rear Panel Components

Item	Component	Qty	Description
1	InfiniBand Port Connector	34	4X QSFP InfiniBand connectors for passive copper cables, active copper cables, active optical cables, and connect optical cables.
2	10Gbps Ethernet SFP+ ports	2	1GbE/10GbE SFP+ ports
3	RS232 serial interface	1	D-sub -9 pin connector (serial interface) for the CLI
4	10/100/1000 Ethernet port RJ-45 Connector	1	Gigabit Ethernet auto-negotiating RJ-45 Connector for management purposes. Speed: 1Gbps/100Mbps/10Mbps (& LED). Provides out-of-band management interface over a local network.
5	LEDs (Status Indicators)	4	Rear panel LEDs: Pwr PS/FAN Info SM I/O Status Refer to LED Indicators (on page 23) for the list of LEDs and their descriptions.
		68	InfiniBand Port Indicators. Indicate the physical and logical status of each InfiniBand port. (2 LEDs per port) 4 10Gb E port indicators.
		4	10GbE port indicators. Indicate the physical and logical status of each 10GbE port. (2 LEDs per port)

Item	Component	Qty	Description
			Green – Physical link LED
			Orange – Logical link
6	USB connector (Type A)	1	One USB 2.0 Host interface allows you to increase the CPU flash memory by a connection to a standard Disk-On-Key device.
7	Chassis reset button	1	When pressed for more than 1 second, resets the entire unit.

NOTE: InfiniBand port #1 is located at the bottom left hand side of the rear panel, InfiniBand port #34 is at the top right hand side.

4   Product Options

4.1   Grid Director 4036E Available Configurations

The Grid Director 4036E is a 1U entry level switch with 34 InfiniBand 4X and 2 1GbE/10GbE ports, providing bidirectional 40 Gbps/20 Gbps per port grid connectivity. The Grid Director can serve as an edge switch in large fabrics (where the Grid Director 4036E is serving as core switch) or as a standalone managed unit in smaller clusters.

4.2   InfiniBand Clusters Using the Grid Director 4036E

The Grid Director 4036E acts as a standalone unit or as a building block for larger clusters.

The following figure show a mid-size two-tier (triple-hop) non-blocking configuration, based on multiple Grid Directors 4036E functioning as the cluster's building blocks.

Figure 7: Mid-size two-tier CLOS InfiniBand Cluster Connected to Ethernet-based High-Performance Storage
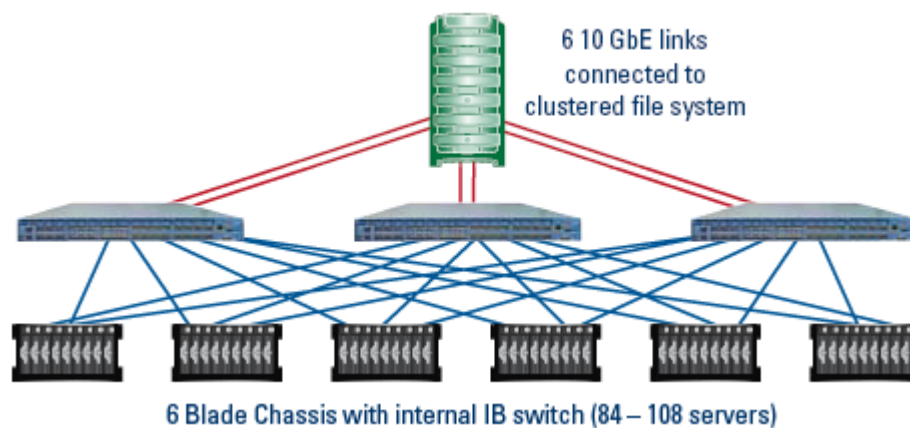
4.3   Ordering Options

This section provides the Grid Director 4036E and modules ordering information.

Table 3: Ordering Information for the Grid Director 4036E

Number	Name	Description
VLT-30034	4036E 34 Port QDR Switch ETH Gateway	Grid Director 4036E 1U 34 port QDR Switch, front-to-back cooling, dual PS
VLT-30035	4036E 34 Port QDR Switch ETH Gateway-Low Mem	Grid Director 4036E 1U 34 port QDR Switch, front-to-back cooling, dual PS, low memory.

Table 4: Ordering Information for the Grid Director 4036E Modules

Number	Name	Description
VLT-30029-F	PS-36 AC FRU	PS-36 AC, FRU

Number	Name	Description
VLT-30030-F	FAN-1U Unit Back-To-Front FRU	FAN-1U unit back-to-front cooling, FRU
VLT-30031-F	FAN-1U Unit Front-to-Back FRU	FAN-1U unit front-to-back cooling, FRU
KIT-00008	Rail Kit	
510K00022-F	CG-24	Cabling guide bracket kit

Table 5: Grid Director 4036E List of Parts (According to Configuration)

Chassis	P/N	Power supply unit	Power cord, PDU plug	Fan unit Air in	Rail kit	Cabling guide bracket kit	Multipurpose Management console cable kit	Product CD (documentation & software)	Getting Started Guide hard copy
		PSU-1U	Power Cord	Fan Unit 1U	KIT-0008	CG-24	Mng		
4036E	VLT-30034	2	2	1	1	*	1	0	1
4036E-LM	VLT-30035	2	2	1	1	*	1	0	1

(*) Optional

5 Technical Specifications and Certifications

5.1 Grid Director 4036E Technical Specifications

The following table details the Grid Director 4036E general technical specifications.

Table 6: Grid Director 4036E Technical Data

Features	Details
Grid Director 4036E - General	• 19-inch mountable chassis, height: 1U, depth: 21" (530 mm) [including handles] • 34 Quad Data Rate (QDR) 40 Gbps ports and 1/10 GbE interconnect ports, SFP+ interfaces

Switch Specifications	• Aggregate data throughput: 2.72 Tb/s (QDR), 1360 Gbps (DDR) or 680Gbps (SDR)
	• Port-to-port Latency:
	  ▪ less than 100 nanoseconds InfiniBand to InfiniBand
	  ▪ less than 2 microseconds InfiniBand to Ethernet
	• Linear Forwarding Table: 48K entries
	• Multicast Table Size: 1K entries
	• Virtual Lanes: 8 Data virtual lanes and 1 management virtual lane
	• MTU: 4096 Bytes (max)

InfiniBand Ports	• 34 QSFP interfaces • 34 4X Quad Data Rate ports (QDR – 40 or 20 or 10 Gbps auto-negotiate) • Interconnect options: QSFP passive and/or active copper/fibre optic cables • All ports are located on the rear panel • Indicators: physical and logical status, Fan OK, Info, I/O, and Power • I/O LED
Ethernet Ports	• Two 1/10 GbE interconnect ports, SFP+ interfaces • IEEE 802.3ab, and 802ad (link aggregation) compliant • IEEE P802.3ak and IEEE P802.3ae 10GBASE-SR, 10GBASELR • Support for Jumbo frames
IETF Protocols	• TCP/IP: IETF RFC-793, IETF RFC-791, IETF RFC-768, RFC-926,RFC-1812, RFC-1027 • IPoIB: IETF RFC 4391, 4392 • VLAN support according IEEE 802.1q (up to 64 VLANS) • IP multicast (IETF RFC 3171) and IGMPv2 (up to 3000 multicast groups) • SNMP v2c: IETF — RFC190x
Management	• The Grid Director 4036E has an active CPU with a Subnet Manager, chassis management, UFM agent, enabling for low-level chassis management purposes and cable optimization. **Physical Ports:** • EIA/TIA-232 console DB-9 connector on the rear panel • RJ45 jack connector for 10/100/1000 Ethernet port on the rear panel • Chassis Reset Button on the front and rear panels

Features	Details
	• USB port on the rear panel
	Device Management:
	• CLI
	• SNMP
	Fabric Management:
	• On-board SM for fabrics up to 648 nodes
	• Mellanox Unified Fabric Manager™ (UFM™)
Indicators	• Fan unit LED indicator on the fan unit
	• PSU LED indicator on the power supply
	• Power supply/fan LED indicator on the front and rear panels
	• Info LED indicator on the front and rear panels
	• SM LED indicator on the front and rear panels
	• System Power LED indicator on the front and rear panels
	• System Temp LED indicator on the rear panel
	• I/O LED indicator on the rear panel
	Refer to LED Indicators (on page 23) for more details.
Cooling	• Hot swappable fan unit containing three fans for high availability
	• Auto-heat sensing for silent fan operation
	• Front-to-rear or rear-to-front cooling (different fan unit Part Numbers)
	• Airflow 52 CFM in turbo mode: 43 CFM in normal mode
Physical Characteristics	• 19-inch front or rear rack-mountable chassis
	• Dimensions (H x W x D): 1.69 in. (43 mm) x 16.93 in. (430 mm) x 20.9 in. (530 mm) [including handles]
	• Fixed rack-mount bracket kit included
	• Optional cabling guide bracket kit designed for cable management
	• Weight: 28.7 lb (13 Kg) including accessories and box.
Environmental	**Operating Temperature:**
	• 32°F to 113°F (0°C to 45°C)
	• Humidity: 15% to 80%, non-condensing
	• Altitude: 0 to 9843 ft (3000m)
	Storage Temperature:
	• -13º to 158º F (-25º to 70º C)
	• Humidity: 5% to 90% non-condensing
	• Altitude: 0 ft to 15,000 ft (4570 m)
	Maximum Ambient Temperature:
	• 45°C

5.2   Power Specifications - Power Supply Module

The following table details the Power Supply specifications.

Table 7: Power Supply Module Data

Attribute	Specification
Power Supplies	• Dual redundant power supply slots • 1 or 2 hot-swappable power supplies, according to configuration • Power supply with built-in power inlet
Electrical ratings [V, A, hz]	Power entries: 100-240Vac, 5.0A, 50/60 Hz, auto-sensing 2.52A@115V (ailto:2.52a@115v)/1.32A@230V
Power Inlet Type	C14
Power Rating	Power consumption*: • Maximum: 240W • Numbers relate to copper cables. For optic cables, add 1.5W per port. • Optical cables configuration-320W, max • Copper cables configuration-240W, max (Typical: 106W) BTU/hour = Watts x 3.413 Each QSFP optical adapter in use adds up to 2.5W max to the above consumption.
Power Factor:	120 Vac/60 Hz/Max Load = 0.99 230 Vac/60 Hz/Max Load = 0.96
Power Supply Efficiency	83%(115V) / 87%(230V)
Leakage current @ 254V	2.422 [mA]
2 power cords, 2-meter long, with a universal plug for PDU (Power Distribution Unit).	

5.3   LED Indicators

The following table lists the LED indicators and their functions and descriptions in their various states.

Table 8: Grid Director 4036E LED Indications

LED Name	Color	Location	Status	Functionality
PWR	Green	Front panel- On each PSU	ON	PSU DC OK
			OFF	PSU DC problem
Fan	Green	Front panel (fan drawer)	ON	All fans operational, Nominal temperature
			OFF	None of the fans are working
			BLINK	At least one fan problem or high temperature
SM	Green	Front panel (fan drawer)	ON	SM is active
			OFF	SM is not active
			BLINK	SM is in standby mode

LED Name	Color	Location	Status	Functionality
Pwr	Green	Front panel (fan drawer)	ON	System power ok
			OFF	System power problem
				I/O LEDs reflect the link, activity and status of the Ethernet part of the 4036E. Refer to Ethernet Gateway LED Indicators (on page 25) for details on the I/O 10GbE LEDs.
Info	Green	Front panel (fan drawer)	OFF	The device does not require attention
			BLINK	The device requires attention
Pwr/Fan	Green	Rear panel	ON	All fans operational, Nominal temperature, PSUs OK
			OFF	All fans are not working or power down
			BLINK	At least one fan problem or high temperature, One PSU problem
SM	Green	Rear panel	ON	SM is active
			OFF	SM is not active
			BLINK	SM is in standby mode
Pwr	Green	Rear panel	ON	System power ok
			OFF	System power problem
Info	Green	Rear panel	OFF	The device does not require attention
			BLINK	The device requires attention
IB physical link	Green	Rear panel on each QSFP port	ON	Port physical link is up
			OFF	Port physical link is down or port is disconnected
			BLINK	Errors, Link is not stable
IB logical link	Amber	Rear panel on each QSFP port	ON	Logical link is configured by SM
			OFF	Logical link is not configured by SM
			BLINK	traffic on the link
Eth link	Green	Rear panel RJ45 connector	ON	Eth link is up
			OFF	Eth link is down
	Amber		OFF	No eth traffic
			BLINK	Eth tragic activity
10GbE Physical link	Green	Rear panel on each SFP+ port	ON	Port physical link is up
			OFF	Port physical link is down or port is disconnected
			BLINK	Error (cannot happen)
10GbE logical	Amber	Rear panel on each	ON	Port physical link is up

LED Name	Color	Location	Status	Functionality
link		SFP+ port	OFF	Error (cannot happen)
			BLINK	Traffic on the link

5.3.1 Ethernet Gateway LED Indicators

Three LEDs are located on the face of the module, indicating link status of the combined interfaces in the integrated Management port (mgmt) and overall system status.

Table 9: 10GbE LED Indicators

LED Type	Function	Status	Description
I/O [green]	I/O state (controlled by Gateway FW)	ON, green	10 GbE Gateway is active
		Blinking slow	10 GbE Gateway is initializing
		Blinking fast	10 GbE Gateway fault – Software in safe mode
Activity indication (per port) [amber]	Logical link	ON	Link is up
		Blinking	Data traffic over the logical link.
		OFF	Link error
Physical link indication (per port) [green]	Physical link	ON	Link is up
		Blinking	Unstable physical link.
		OFF	Link down - no physical link.

5.4 Certifications

The Grid Director 4036E has the following certifications.

➢ *Safety*

- cMETus UL 60950-1:07 Second Ed.
- CSA C22.2 No. 60950-1-07 Second Ed
- cTUVus UL60950-1: 07 Second Ed.
- S-Mark Argentina
- CB Certificate and report, according to IEC 60950-1 Second Ed.
- KCC Korea
- Gost-R
- CE according to EN 60950-1:06 Second Ed
- S-Mark

➢ *EMC Certifications*

- FCC Part 15, Subpart B, Class A and testing to ANSI 63.4

- Industry Canada ICES-003 (CAN/CSA-CEI/IEC CISPR 22:02)

- CE EN55022: 1998 + A1:2000 + A2:2003
  EN55024: 1998 + A1:2001 + A2:2003
  EN 61000-3-2:00+A2(05) Harmonic current emissions
  EN 61000-4-2: 1995 + A1: 98 + A2: 2001
  EN 61000-4-3: 02 + A1: 2002
  EN 61000-4-4: 1995 + A1: 01 +A2:2001
  EN 61000-4-5: 1995 + A1: 2001
  EN 61000-4-6: 1996 + A1: 2001
  EN 61000-4-8: 1993 + A1:2000
  EN 61000-4-11: 1994 + A1: 2001
  EN 61000-3-3:95+A1 (01) Voltage fluctuations and flicker

- Japan VCCI Technical Requirements, V.3/2001.04/CISPR 22:1997 + A1: 2000 + A2: 2002, Class A.

- Australian/New Zealand C-Tick, AS/NZS CISPR22:2009 Class A

- KCC Korea

➢ *Restricted Hazardous Substances Certification*

RoHS-6

➢ *InfiniBand Certification*

IBTA 1.2

Note: For information about the certifications for each Mellanox product, see the Mellanox Regulatory and Compliance document.

5.5   Gost-R Certification

Mellanox products comply with the Gost-R Russian safety regulations.

5.6   Declarations

5.6.1   Declaration of Conformity

Mellanox products comply with the Radio & Telecommunications Terminal Equipment Directive 99/5/EEC, the EMC Directive 2004/108/EC, and of the Low Voltage Directive 2006/95/EC.

5.6.2   Hazardous Substances (RoHS 6) Compliance Declaration

Mellanox products comply with the RoHS directive.

5.7 Label(s)

The following Grid Director 4036E label (example) shows all safety and EMC text and logos pertaining to the 4036E.

Figure 8: Grid Director 4036E Label (Example)
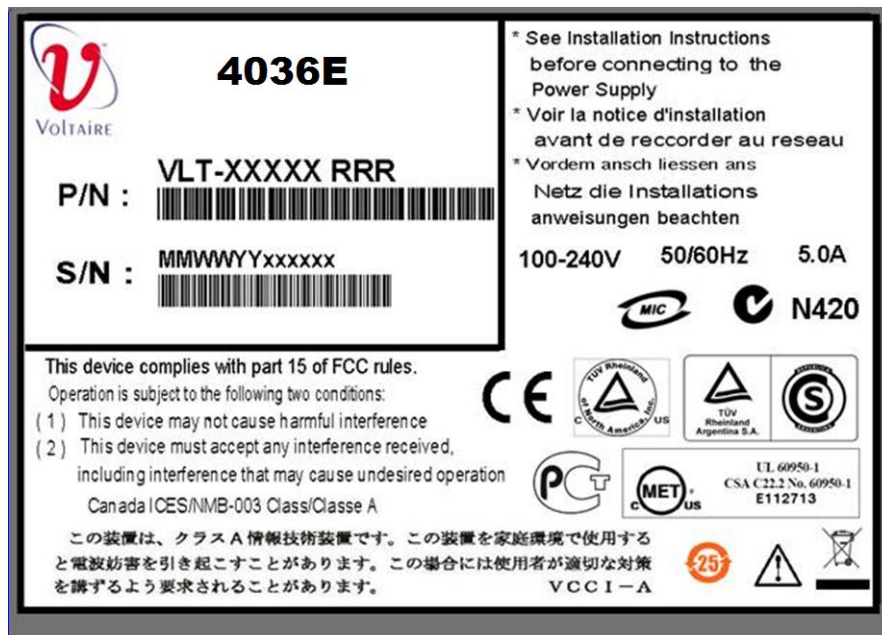
5.8 Shock and Vibration

Prepare the Grid Director 4036E to ship by carefully following the rail kit installation instructions, as detailed in Hardware Installation (on page 30). The Grid Director 4036E is susceptible to shock and vibration if the rail kit installation instructions are not followed precisely.

The following tables detail the Grid Director 4036E vibration and free fall tests for transportation.

Table 10: Vibration

Test	Description	
Vibration Axes	3 axes (X,Y,Z)	
Non-Operating Random Vibration	Frequency range:	5-300Hz
	Vibration level:	Z axis, 1.03g RMS X,Y axis 0.698g RMS
	Vibration test for each axis	60 minutes
Operating Sine Vibration	Frequency range:	5-500Hz
	Vibration level:	0.1G peak
	Vibration test for each axis	40 minutes
Operating Shock	Vibration Level	Z axis, 5g peak

Test	Description	
(half-sine)	Shock test for Z axis	3 shocks, 10ms duration each shock

Table 11: Free Fall

Test	Description
Drop Height	1 meter
Number of drops of test item	The packaged equipment is dropped once on each of its six surfaces.
Total number of drops	6 drops

5.9 Chassis Clearance Requirements

The following table details the Grid Director 4036E clearance requirements.

Table 12: Clearance Requirements

Area	Recommended Minimum Clearance
Front of the rack	4" (10 cm)
Rear side of the rack	4" (10 cm)
Space below the chassis	No limits
Space on top of the chassis	No limits

5.10 Weights and Dimensions

The following table details the Grid Director 4036E and modules weights and dimensions.

Table 13: Unpacked Weights & Dimensions

Module	English (lbs/in)				Metric (kg/cm)			
	Weight	D	W	H	Weight	D	W	H
4036E chassis	17	21*	17**	1.7	9.2	53*	43**	4.3*
Power Supply	2.8	10.2	4.9	1.6	1.3	26	12.4	4
Fan	1.1	4.1	7.1	1.7	0.5	10.5	18	4.3

1 in = 2.54 cm   1 kg = 2.205 lbs

* Including handles

** Without rack brackets

Table 14: Packed Weights & Dimensions

Module	English (lbs/in)				Metric (kg/cm)			
	Weight	D	W	H	Weight	D	W	H
4036E chassis	28.66	24.41	22.44	6.69	13	62	57	17

5.11 Acoustic Data

The Grid Director 4036E acoustic noise Sound Pressure Level is: **64.3 dB** (A)

5.12 Export Information

The Grid Director Export Control Classification Number (ECCN) is 5A002.a.1.

5.13 Shipping Restrictions

None.

6　Hardware Installation

6.1　Hardware Installation Overview

This chapter describes how to prepare your site for installation and how to prepare and install the Grid Director 4036E.

The Grid Director 4036E is a 19" rack mounted, 1U high chassis provided with a rail kit accommodating racks of different depths with a front-to-back distance between mounting rails of 26" to 36" (660 mm to 914 mm).

Mellanox recommends using the optional Grid Director 4036E Cabling Guide Brackets to arrange the numerous cables that are connected to a chassis.

6.2　Installation Options

Option 1 – Install the front of the switch facing the front of the rack and with a 5-in. indentation. This allows AC inlets accessibility from the front of the rack while the power cables are routed sideways to the power source. Refer to Option 1 (on page 34) for more details.

Option 2 – The rear of the switch (InfiniBand connector side) faces the front of the rack and is installed in-line with the rack's front rails. Refer to Option 2 (on page 40) for more details.

> **CAUTION:**
>
> Before installing the Grid Director 4036E in a rack, read the sections on Site Planning (on page 31) and Safety Information to get familiar with proper site and environmental conditions.

6.2.1　Cooling

For both option 1 and option 2 above, the switch can support both front to rear and rear to front cooling options, based on the specific part number that was ordered (different fan unit).

6.3　Required Tools

This section lists the materials and tools required for mounting the Grid Director 4036E into a rack.

Table 15: Material and Tools Required

Quantity	Description
1	Flat-blade screwdriver
1	Phillips screwdriver
1	Measuring tape
8	Floating clip nuts (not provided by Mellanox)
8	Phillips screws (not provided by Mellanox)

6.4 Site Planning

Planning the proper location and layout of your equipment rack or wiring closet is essential for successful Grid Director 4036E operation. Placing the equipment too close together or in an inadequately ventilated area can result in overheating of the system. In addition, poor equipment placement can render system panels inaccessible and difficult to maintain.

To ensure normal operation and avoid unnecessary maintenance, plan your site configuration and prepare your site *before* installation.

6.4.1 Rack and Clearance Requirements

The Grid Director 4036E occupies 1U in a 19"rack. You can mount it either way, with the InfiniBand ports facing the rear or the front of the rack. Switch cooling direction is either from back-to-front or front-to-back, according to the switch fan unit configuration.

The rack brackets mounting holes conform to the IEA-310 standard for 19-inch racks.

There are no restrictions on rack location.

Mellanox recommends:

- Mounting the Grid Director 4036E near the middle of the rack, at or near eye level, to make it easy to see status indicators, port numbers, etc.

- Mounting the rear side of the Grid Director 4036E in a way that enables easy access to the InfiniBand cables, connectors, and LED indicators.

- Leaving a 4" (10 cm) for chassis clearance both at the front and the rear of the chassis.

These requirements are also listed in Chassis Clearance Requirements (on page 28).

6.4.2 Site Environment Specification

For the operating and non-operating environmental site requirements, refer to Power Specifications - Power Supply Module (on page 22).

The system can continue to operate within specified environmental ranges; however, a measurement that approaches the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental conditions before they exceed the maximum operating range.

6.4.3 Power Requirements

Power requirements are useful for planning the power distribution system needed to support the Grid Director 4036E. Heat dissipation is an important consideration for sizing the air-conditioning requirements for an installation. Verify the available power source at the site for the type of device you are installing:

- The Grid Director 4036E requires at least one power connection using standard 3-wire AC power cords including a safety ground.

- The Grid Director 4036E includes two hot-swappable redundant power supplies, providing full back-up purposes.

For the Grid Director 4036E power requirements and input voltage characteristics, refer to Power Specifications - Power Supply Module (on page 22).

6.4.4 Site Preparation Checklist

To help prepare your site for installing the Grid Director 4036E chassis, use the checklist below.

Table 16: Site Preparation Checklist

Task	Prepared by	Date	Notes
Environmental requirements			
Locate power sources			
Measure space for the rack, including specified maintenance clearances			
Acquire specified cables and connectors			

6.5 Measuring the Distance between Mounting Rails

> *To measure the distance between the rack's mounting rails:*

1. Place the 4036E chassis on a flat surface.

2. With the use of a measuring tape, measure the front-to-back distance between the rack vertical mounting rails. This step is very important so that you know exactly how to calculate the exact rail length.

3. Mark the rack's U levels at which you would like to mount the switch. This is important so that you can install the clip nuts in the adequate holes and ensure that the chassis is leveled.

4. Using a flat screwdriver, install the clip nuts in the rack at the U level noted in 3.

6.6 Assembling and Mounting the Rail

6.6.1 Rail Kit
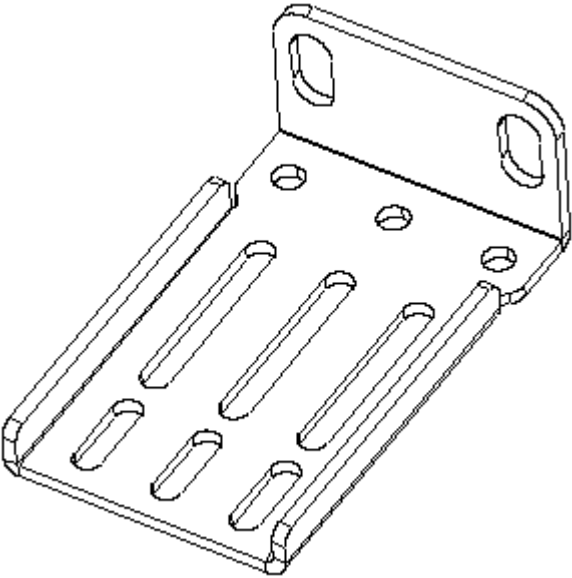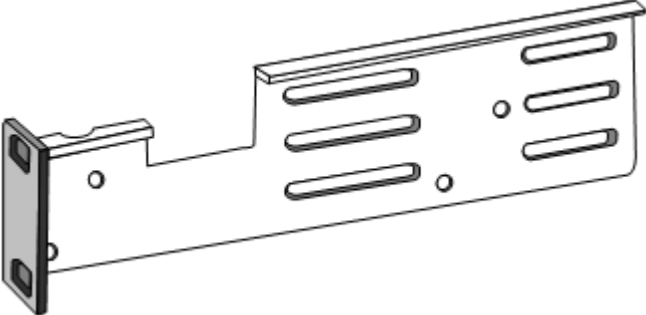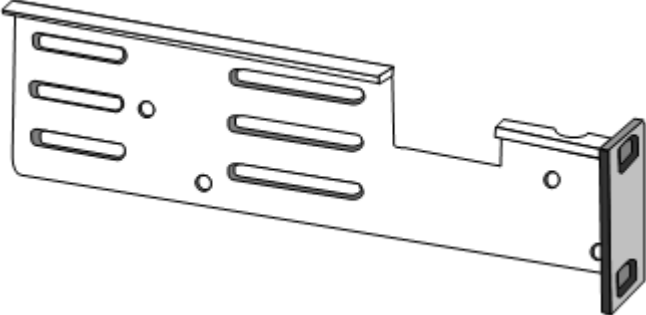
Mellanox supplies the fixed rail as part of the rail kit and accommodates different rack depths.

The rail mounting has holes that are spaced two inches apart. You can mount them in several positions along the side of the chassis to accommodate the depth of the rack.

The following table shows the list of items required for the installation of the fixed rail.

Note: Item sizes are not proportional

Table 17: Rail Kit (P/N KIT-00008) Detailed Part List

Item	P/N	Illustration
2 x short bracket	290000169	
2 x Mounting Bar	MEC-00556	 Front side of the chassis Rear side of the chassis
14 x Pan Head Philips Screw, 8-32 x 1/4" with tooth lock washer and nylon patch	FAS-00044	
Long Bracket (right side)	MEC-00555	
Long Bracket (left side)	MEC-00554	

6.6.2   Option 1

This option describes how to assemble and mount the rail and install the switch where the front of the switch faces the front of the rack. The front of the switch is recessed by 5 inches from the vertical rail of the rack to allow connecting the power cords from the front side of the rack.

Figure 9: 4036E – Option 1 Rack Mount Assembly
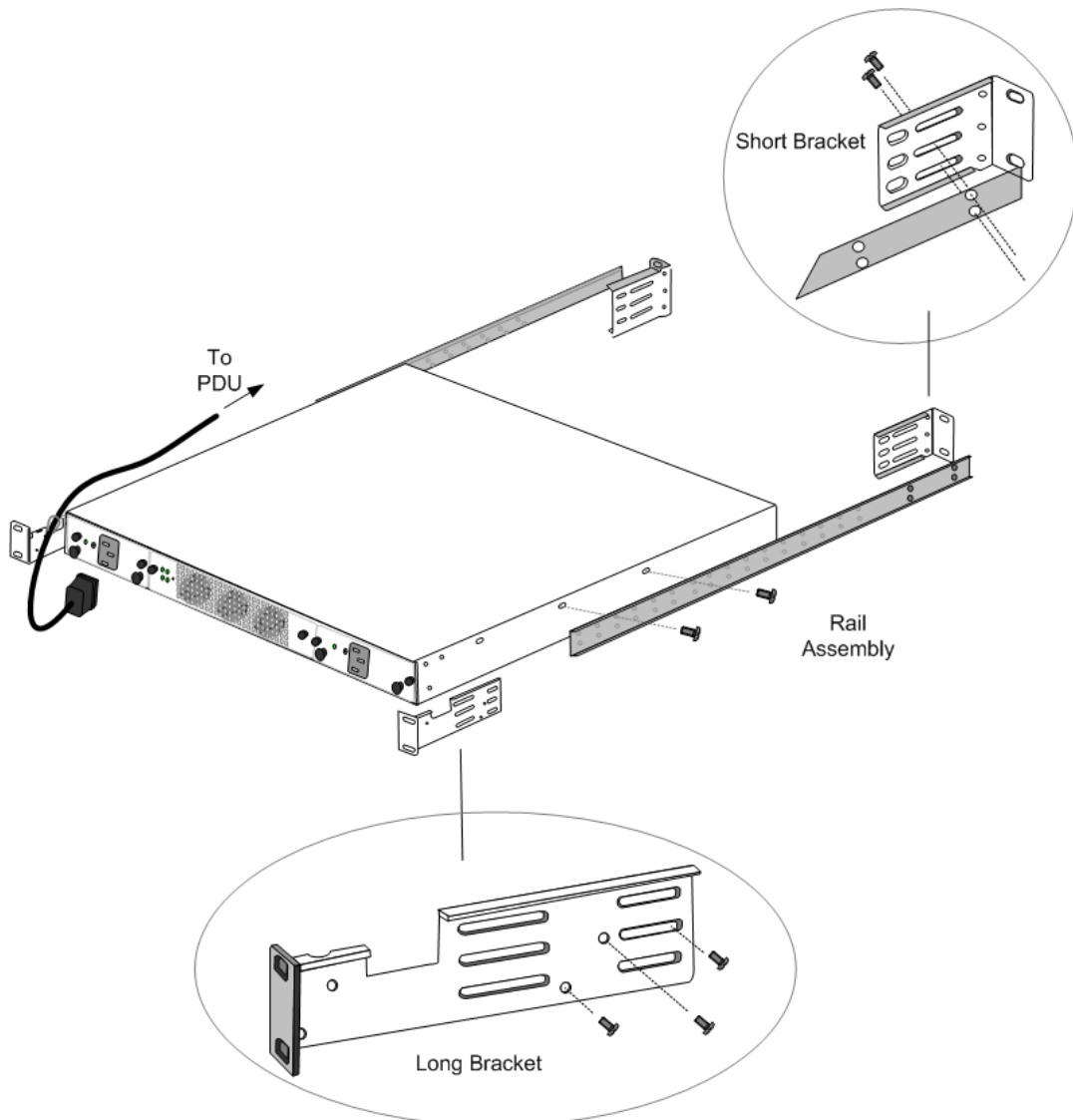
NOTE: Mellanox does not provide standard rack clip nuts and rack screws.

➢ *To mount the 4036E in a rack using Option 1:*

1. Put the chassis on a flat surface.

2. Mount the long bracket at the front of the chassis using three 8-32x1/4" pan head Philips screws.

Important: Left and right long brackets are different. Make sure that you are using the correct bracket. The mounting ear at the end of the bracket should face out.

3. Position the mounting bar and adjust it according to the rack measurements you made in .

   Note: Make sure that the distance is between 0.5" to 1" smaller than the distance you measured between the two vertical rack rails.
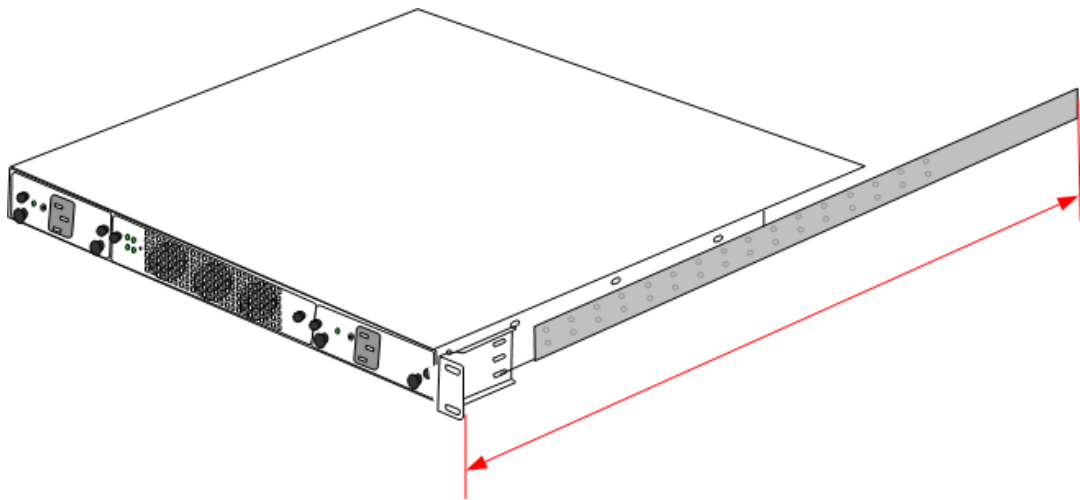
   Total distance = rack measurements you made in .

4. Connect the mounting bar to the side of the switch using two 8 32x1/4" pan head Philips screws using the top holes of the mounting bar.

   Make sure to install one screw at the center of the switch and the second one at the rear of the switch.

5. Repeat the above steps on the other side of the chassis.

6. Ensure that the clip nuts are already installed in the rack holes of the correct U level (on all four vertical rack rails) as described in .

Note: Mellanox does not provide rack clip nuts.

7. Place the power cords with the female connector facing the front of the rack (or the switch) with approximately 10" hanging out of the front.

8. Route the other side (male connector) of the power cord to the rear of the rack. Do not connect it to the PDU at this stage.

9. Lift and position the chassis, aligning the holes of all brackets with the rack holes of the correct U level.

10. Gently push the switch inwards leaving it slightly protruded.

11. Place the power cords over the indentation of the long brackets.

12. Secure each power cord with a cable tie wrap so that you can still adjust the length of the cord if required.

13. Connect the power cords to the switch power supplies (PSU).

14. Push the switch inwards (from the front side of rack) until the long bracket comes together with the rail.

15. Fasten the long brackets to the rack's vertical rails using two screws per bracket and tighten them.

16. Mount a short bracket from the inner side of the mounting bar and fasten it using two 8-32x1/4" pan head Philips screws.

Use the lower holes in the short bracket as shown in the figure.
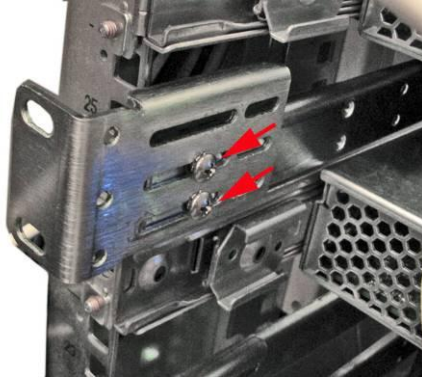
Important: At this stage, do not fully tighten the screws.

17. Adjust the short brackets snuggly onto the rack's vertical rail using the adjusting holes (make sure that the rail is perfectly aligned by using the same U as used in the front of the rack).

18. Tighten the rack screws (rack screws are not supplied).

19. Tighten the short brackets to the mounting bars.
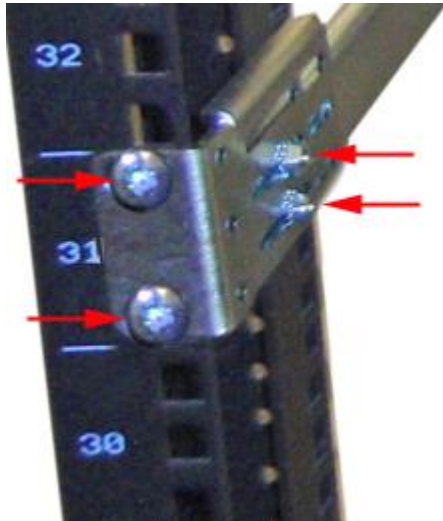
Figure 10: Result – Rack front view

6.6.3   Option 2

This option describes how to assemble and mount the rail and install the switch where the rear of the switch (InfiniBand connector side) faces the front of the rack. This rear-to-front chassis installation is in-line with the vertical front rails of the rack.

Figure 11: 4036E – Option 2 Assembly
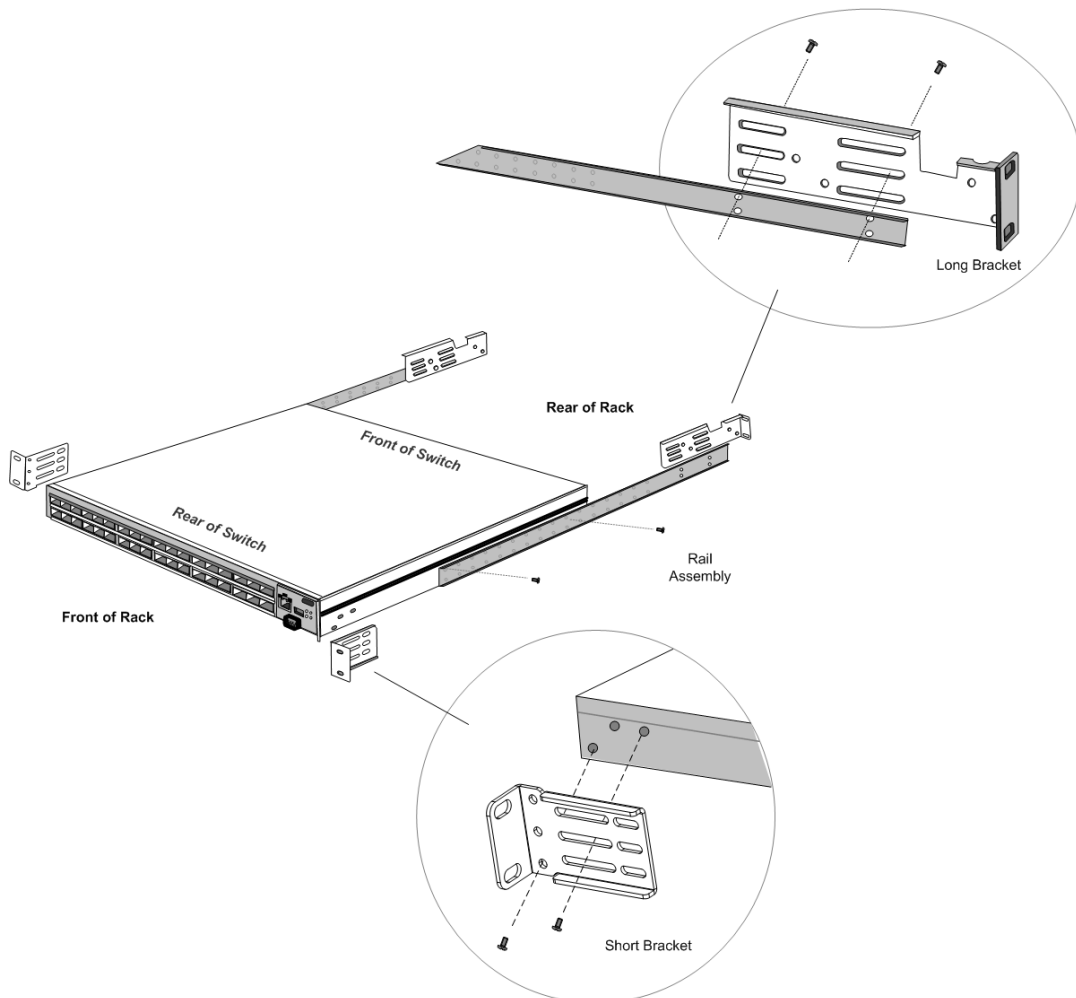
> **NOTE:** Mellanox does not provide standard rack clip nuts and rack screws.

➢ *To mount the 4036E in a rack using Option 2:*

1. Put the chassis on a flat surface.

2. On each side of the chassis, mount the short brackets on the rear side of the switch (InfiniBand port side) using three 8-32x1/4" pan head Philips screws, as shown on the picture.
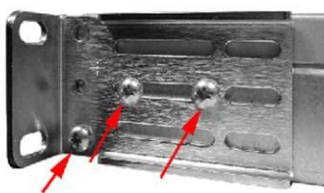
3. Mount the long bracket at the front of the chassis using two 8-32x1/4" pan head Philips screws. Use the long bracket middle row orifices and the holes of top row on the rail. Note that the left and right long brackets are different. Make sure that you are using the correct bracket. The mounting ear at the end of the bracket should face out.

Important: At this stage, do not fully tighten the screws.
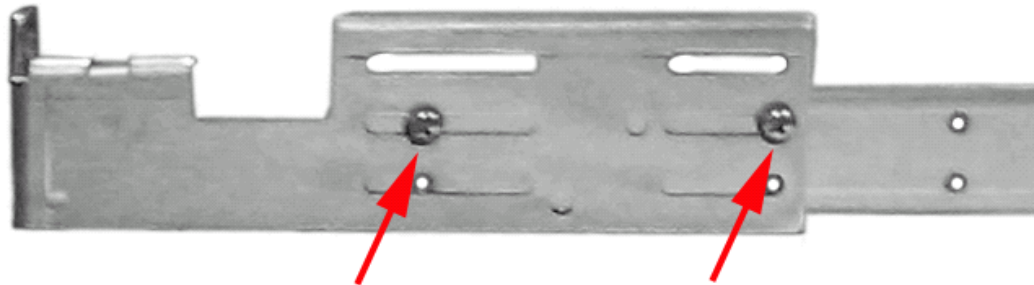
4. Position the mounting bar and adjust it according to the rack measurements you made in Measuring the Distance between Mounting Rails (on page 32).

Note: Make sure that the distance is between 0.5" to 1" greater than the distance you measured between the two vertical rack rails to allow adjustment at a later stage.
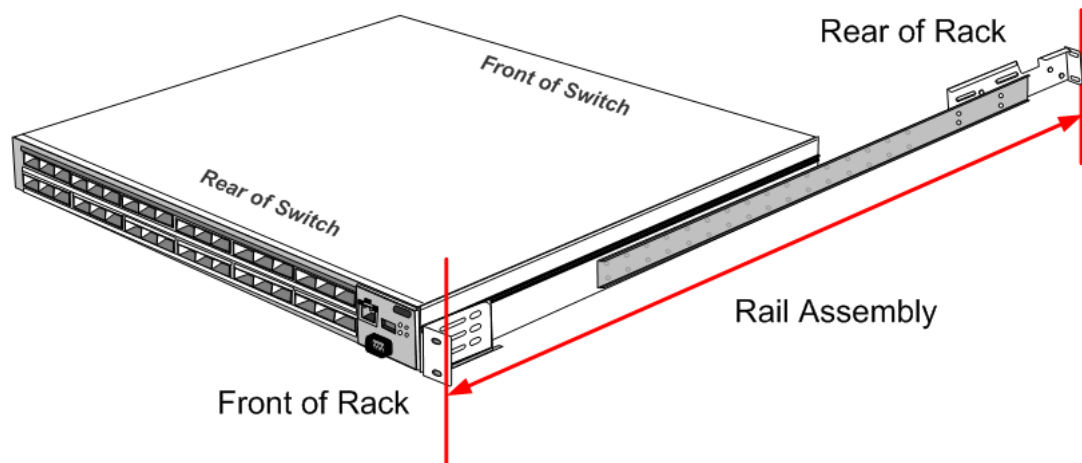
Total distance = rack measurements + 0.5 to 1" for adjustment.

5. Secure the rail on the side of the switch using two 8-32x1/4" pan head Philips screws (use the holes on the top row). Make sure you install one screw in the middle of the switch and the other screw at the edge (use the holes on the top row of the rail).
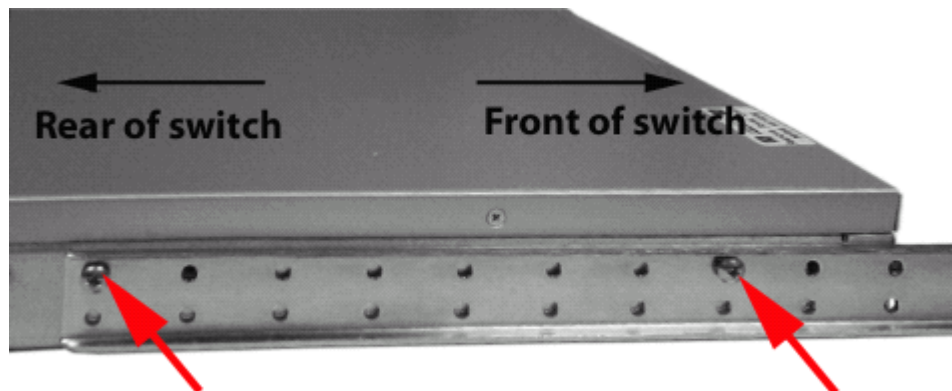
6. Ensure that the clip nuts are already installed in the rack holes of the correct U level (on all four vertical rack rails) as described in Measuring the Distance between Mounting Rails (on page 32).

   Note: Mellanox does not provide rack clip nuts.
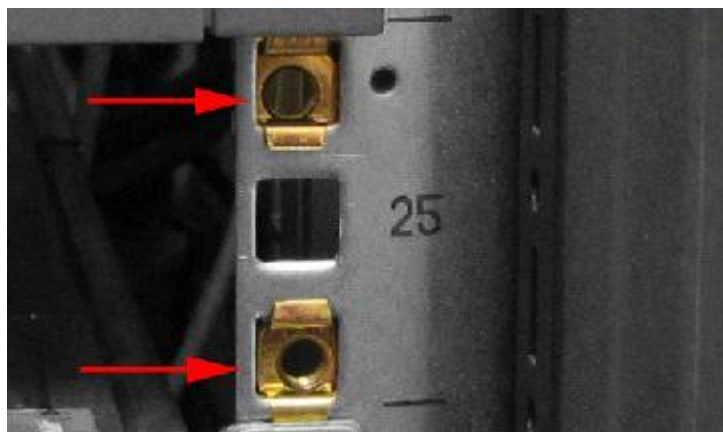
7. Go to the front of the rack.

   Note: For ease of installation, at least two qualified people should perform the following steps.

8. Lift and position the switch with the connectors facing towards you and insert it into the rack.

9. Align the short bracket holes with the rack holes of the correct U level and secure them using two rack screws on each side (not provided by Mellanox).

10. Go to the rear of the rack.

11. On each side, align the long bracket holes with the rack holes of the correct U level and secure them using two rack screws (not provided by Mellanox) and two rail screws.
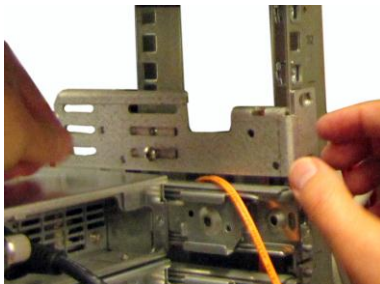
12. Tighten the rack screws (rack screws are not supplied).

13. Tighten the long brackets to the mounting bars.
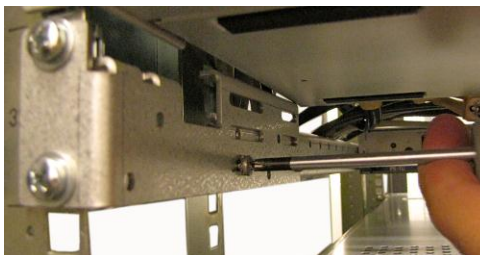
Important: This step should be done last.

14.Result – Rack front view

6.7 Grid Director 4036E Power Up

Once the 4036E chassis is secure within the rack, prepare the electrical cables from the power distribution source for connection.

Mellanox supplies two power cords, one per power supply unit.

➢ *To power up the Grid Director 4036E:*

1. Ensure you have met all site power requirements before connecting the chassis to a power source.

2. Before turning on the power, verify that the power supplies and fan tray are properly inserted.

3. Connect the power supply cords to the AC inlets of the Power Supplies (PSU) located at the front of the chassis.

4. Connect the other side of the power cords to the PDU.

5. The PWR LED indicator lights up.

6.8 Field Replaceable Units

6.8.1 Fan Unit

The Grid Director 4036E has a hot swappable Fan Unit with three fans that are used to maintain proper cooling.

- In normal operation, the three fans work at 50% utilization.

- In case of fan failure or high temperature detection, the fans go into Turbo mode. In case of fan failure, the fan drawer LED and the PS/FAN LED on the rear panel blink.

- When removing the fan unit, the system can continue to function for up to 5 minutes before installing a new fan unit.

Figure 12: Replacing the Fan

➢ *To replace the hot-swappable Fan module:*

1. Release the captive fasteners at each side of the fan and gently remove it from its slot.

2. Position the rear of the new fan in the slot.

3. Holding the fan level, slide it into the slot until it meets resistance at the chassis connector. It should slide smoothly and easily.

4. Push the module further until it is seated completely.

5. Use the captive fasteners at each side of the fan to secure it in place.

6.8.2   Power Supplies

The Grid Director 4036E has two identical hot swap Power Supplies in the side bays of the unit chassis to maintain proper cooling (as shown below).

- The Grid Director 4036E supports current sharing operation of the two power supplies, if applicable.

- When removing a power supply from the chassis, the additional power supply can power the entire chassis.

Figure 13: Replacing the Power Supply

➢ *To replace a hot-swappable power supply module:*

1. Release the captive fasteners at each side of the power supply and gently remove the power supply from its bay.

2. Position the rear of the new power supply in the bay.

3. Slide the power supply into the slot until it meets resistance at the level of the chassis connector. It should slide smoothly and easily.

4. Push the module further until it is seated completely.

5. Use the captive fasteners at each side of the power supply to secure it in place.

7   Cabling

7.1   Cabling Overview

This chapter provides details on the Grid Director 4036E cable guide brackets installation and cable management.

7.2   Cabling Guide Bracket Installation

NOTES:

Consider the overall cluster configuration to determine the optimal InfiniBand cable length. Proper planning will produce orderly and maintainable cabling.

The rack space for the Grid Director 4036E should be free from obstructions such as power strips.

The Cabling Guide brackets (CG-24) are optional; however, we recommend using the Cabling Guide Brackets.

You can install the rack mounted Cabling Guide Brackets (CG-24) in the back of the rack itself, facing out.

Rack rails should be free of PDU and power inlets.

Figure 14: Cabling Guide Bracket (CG-24)
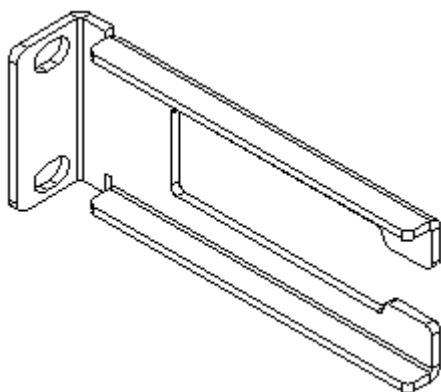
➢ *To Install the Cabling Guide Brackets (CG-24):*

1. Install the Cabling Guide Bracket at the rear of the rack itself, on top or the rail bracket, using two standard rack screws, as shown in Figure 7-2.

2. Repeat on the other side.

3. Tighten the screws.

Figure 15: Installing a Cabling Guide Bracket

Figure 16: Installing a Cabling Guide Bracket (sliding rail)

You can see the results in the following figures.

Figure 17: Cable Management
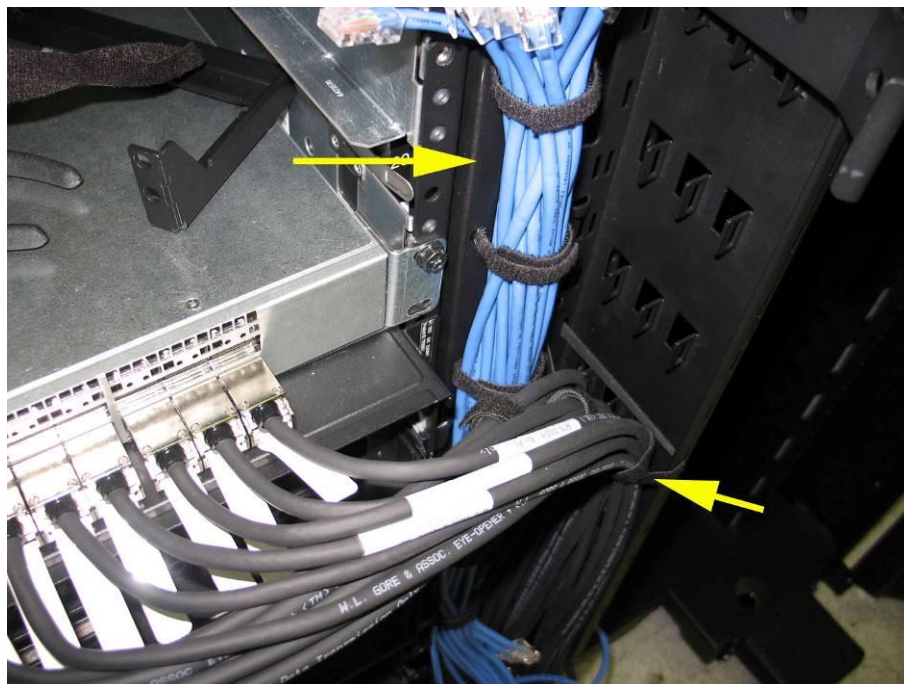
7.3   Cabling

Consider the overall cluster configuration to determine the optimal cable length. Proper planning will produce orderly and maintainable cabling.

For the InfiniBand cables, we recommend dressing the cables from each row of QSFP connectors into two groups running them left and right, fastening them down gently after verifying the connectivity, and routing them down along the rack sidewall.

This section assumes that you have already determined the cable lengths and inter-rack cable routing.

The cables are connected to the Grid Director 4036E rear panel.

> **NOTE:** You can connect and disconnect cables while the Grid Director 4036E is powered on.

➢ *To connect a cable to a Grid Director 4036E:*

1. Insert the cable into the Cabling Guide bracket, if it applies.

2. Position the connector opposite a connector located on the rear of the 4036E chassis. Depending upon the connector type, squeeze the tabs on either side of the head shell and push the connector in place.

   OR

   Gently push the latch and push the connector in place.

3. Verify that the cable is inserted properly into the connector by gently tugging the cable; verify that the Link State green-colored LED lights (and does not flash) indicating a good physical connection.

4. Route the cable to the nearest convenient rack location and gently fasten in place with Velcro tie or tie wraps.

> **CAUTION:**
>
> Avoid using tie wrap guns or similar tools; do not fasten the cables too tightly, as this may cause irreversible damage.
>
> Tie wraps and zip ties could cause potential damage to the cables. We recommend Velcro tie.
>
> Do not bend the InfiniBand cables too sharply. The minimum bend radius is 4" (10 cm).

➢ *Cabling — Do's and Don'ts*

 Do not kink the cable

 Do not over-bend the cable behind the connector

 Do not twist the connector

For Port Cable Specifications, refer to Cabling Information and Specifications (on page 54).

7.4   Multipurpose Management (Mng) Console Cable

For out-of-band management of a Grid Director 4036E, Mellanox provides a single Multi-purpose cable kit (Figure 7-6).

It contains the Mng cable and the two following adaptors:

- RJ45 to RJ45 cable

- A RJ45 to DB-9 cross-adaptor for RS-232 console connection (CLI). (The DB-9 adaptor has a number 26 printed on it. This means that pins 2 and 6 are crossed).

- A RJ45 to DB-9 adaptor for RS-232 console connection

Figure 18: Console Cable Kit (Mng)

> **NOTE:** You can connect the serial and Ethernet management ports of a Grid Director 4036E simultaneously. However, you cannot connect the Ethernet ports of the front and the rear panels simultaneously.

➤ *To connect multi-purpose cable of a Grid Director 4036E*

1. Connect the DB-9 connector and the RJ45 connector to each extremity of the multipurpose console cable (Mng).

2. Connect the DB-9 connector to the Grid Director 4036E CLI port.

3. Connect the RJ45 connector to the Ethernet port either on the rear panel or on the front panel (but not to both).

8   Operation

8.1   Operation Overview

This chapter describes how to power on and operate the Grid Director 4036E, once the installation is complete. The Grid Director 4036E operation consists of making sure that the switch starts up properly and that any initialization problems are resolved.

8.2   Powering the Grid Director 4036E

To start up the 4036E unit:

- Verify that the 4036E chassis is secure within the rack.

- Verify that the InfiniBand cables are plugged into the rear panel ports.

- Verify that the AC electrical mains outlet(s) is available to connect the 4036E AC cable(s).

> **CAUTION:**
>
> Ensure that all site power requirements have been met before connecting the chassis to the power source.

> **NOTE:**
>
> Line cords should be connected to separate AC circuits for maximum fault tolerance in the event of power problems.
>
> For more details regarding the unit's indicators, refer to Grid Director 4036E LED Indicators (on page 23).

Once the 4036E chassis is secure within the rack, you can prepare the electrical cables to connect to the power distribution source.

> ➤ *To start up the Grid Director 4036E:*

1. Ensure that all site power requirements have been met before connecting the chassis to a power source.

2. Before turning on the power, verify that the power supplies and fan tray are properly inserted.

3. At the front of the Grid Director 4036E, plug the power cord into the power receptacle. Repeat for the other power supply, if present.

4. Check that the power supply indicator light is green. Repeat for the other power supply, if present.

5. Check for the following Grid Director 4036E status indicators:

   - PWR: Lights in green, indicating that the Grid Director 4036E is functional.

- SM: Indicates the subnet management functionality: on for active mode, blinking for standby mode.

- PS/FAN: Lights solid green, indicating that the Grid Director 4036E is properly powered and the fan unit is functioning adequately.

- I/O LED: Indicates that the Ethernet gateway is functional.

Led State	Indication	Comment
Slow blink	System initializing	Blinking frequency: ~1 Hz
On	System OK	Takes about 2 minutes from reset/power up
Fast blink	System fault	

If some of these conditions are not met, refer to Solving Startup Problems (on page 53) to isolate and, if possible, resolve the problem.

8.3 Where to Go Next

Once you have installed the 4036E hardware, you can start the system configuration. To configure the system, refer to the Grid Director 4036E User Manual.

9 Troubleshooting

9.1 Troubleshooting Overview

This chapter provides suggestions for solving startup problems and useful information when contacting Mellanox Customer Service.

9.2 Solving Startup Problems

Try to solve startup problems using the Grid Director 4036E LED indicators.

➢ *Case 1: Problem with power supply – How do I know that my power supply is not functional?*

Check the power cord and its connections. Check the installation of the power supply module.

If the indicator is blinking, the 4036E power supply is faulty. Replace the power supply module, if necessary.

> **NOTE:**
>
> In single power supply systems, the AC power cord must be plugged into the same side of the chassis as the power supply

➢ *Case 2: What to do when there is a Fan indication problem?*

Replace the Fan Unit.

➢ *Case 3: When the physical link indicator is OFF, is the InfiniBand cable or connector faulty?*

When the physical link indicator is ON, the logical link indicator is OFF, and the SM indicator is ON, the InfiniBand cable or the connector is faulty. In case the InfiniBand cable is faulty, replace the cable. If you could not solve the problem, contact your Support representative.

9.3 Preparation before Contacting Customer Support

If you are unable to solve a startup problem after using the troubleshooting suggestions in this chapter, contact a customer service representative for assistance and further instructions. Before you call, have the following information ready to help your service representative assist you as quickly as possible:

- Date you received the Mellanox Grid Director 4036E

- Chassis serial number (located on a label on the bottom of the chassis)

- Type of software and release number

- Maintenance agreement or warranty information

- Brief description of the problem

- Brief explanation of the steps you have already taken to isolate and solve the problem

Appendix A: Cabling Information and Specifications

A.1   QSFP Cable

QSFP (Quad Small Form-factor Pluggable) Key Features:

- Small size, high density, hot-pluggable connector with four transmit and four receive channels

  - Supports both types of cables:
  - Copper active or passive cable

    - Copper passive cable equipped with two simple passive connectors and a standard copper cable
    - Copper active cable equipped with an active device to optimize signal quality

  - Fibre optic cable delivered as either:

    - Fibre cable with two separate modules
    - Active optic cable where cable and optic adaptors are delivered as a single unit (permanently attached cable)

- Data rate: 2.5 Gbps (SDR), 5 Gbps (DDR), and up to 10 Gbps (QDR) per channel

- QSFP optic modules use standard MPO parallel 12-fibre jacketed ribbon optical connector

- Provide manageability, discovery, and identification capability, such as vendor identification, module part number, serial number, cable type, using low-speed two-wire (I2C) interface

- Active cables: Integrates digital diagnostic capability to monitor link performance

- Latching mechanism

- Mechanical Dimensions:

Figure 19: QSFP Connector-Dimensions
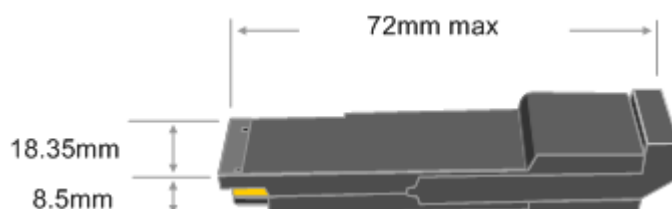
NOTE:

QSFP to CX4 cables are available to connect 4036E equipped with QSFP with legacy DDR/SDR systems equipped with CX4 connectors.

QSFP Cable Overview

Every 4036E port on the switch is equipped with transmit and receive circuits that can adjust to fit different types of link characteristics and either optical or copper cables.

The QSFP cables shown below transmit and receive up to 10 Gbps per channel (total: up to 40 Gbps per port) over a single active/passive optical or copper cable, Passive copper cables do not consume any additional power while active copper and optic cables consume up to 2.5 Watt.

The following figure shows the QSFP module with Copper or Optical cables. You can install any combination of the three cable types in any of the 36E QSFP cages.

**Figure 20: QSFP and 10 GbE Connectors**
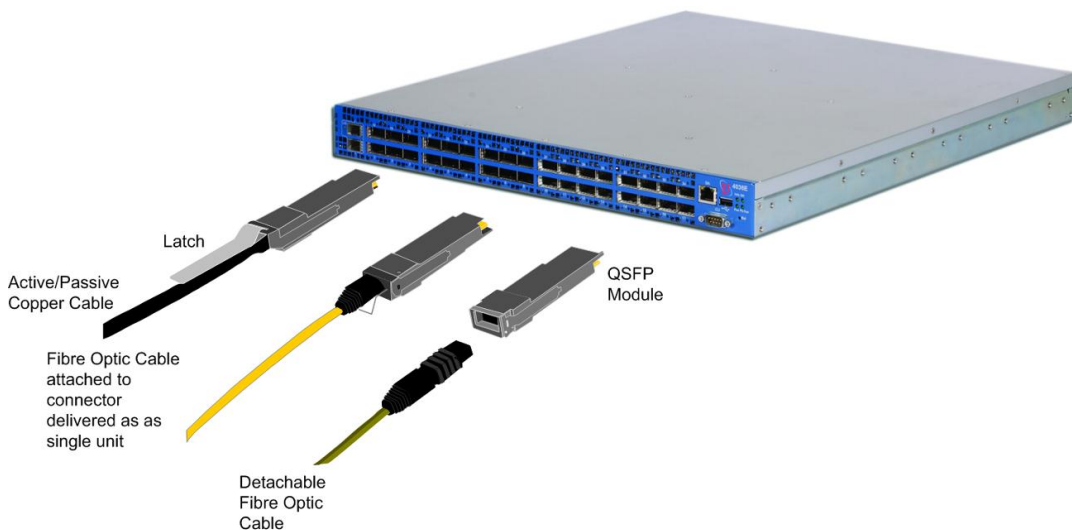
A.2   10 GbE SFP+ Ethernet Cable

SFP+ Key Features:

- Small size, high density, hot-pluggable connector with a transmit and a receive channel.
- Supports both types of cables:
  - Copper active or passive cable
    - Copper passive cable is equipped with two simple passive connectors and a standard copper cable.
    - Copper active cable equipped with an active device to optimize signal quality.
  - Fibre optic cable delivered as either:
    - Fibre cable with two separate modules
    - Active optic cable where cable and optic adaptors are delivered as a single unit (permanently attached cable)

- Data rate: 10/100/1000/10000 Mbps

- SFP+ optic modules (Small Form-factor Pluggable) use standard LC-LC coupled-single fibre jacketed optical connector.

- Provides manageability, discovery, and identification capability, such as vendor identification, module part number, serial number, cable type, using low-speed two-wire (I2C) interface.

Figure 21: SFP+ Connector-Dimensions
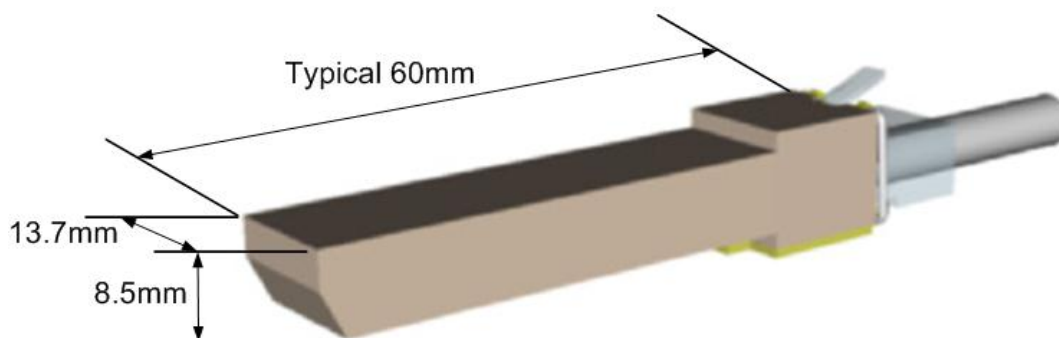
Every 10G port on the switch is connected via an AEL2005 PHY device that can adjust to fit different types of link characteristics with either optical or copper cables.

The SFP+ cable transmits and receives up to 10 Gbps per port, over a single optical or copper cable. Active copper and optic cables consume up to 1 Watt. Passive copper cables do not consume additional power. This appendix provides cabling and port pinout information for the Grid Director 4036E.

A.3   IB Port Cable Specifications

For information regarding which specific cable vendors/lengths are supported with Mellanox switches, please contact Mellanox support.

A.4   SFP+ Port cable Specifications

The following table describes cabling specifications for the 4036E 10Gb E ports.

Table 18: 4036E 10Gb E Ports Cabling Specifications

Type	Maximum Fiber Length			
	Supported modules	Length (ft.)	Length (m)	Mellanox Cable P/N
Optic SR 4036E<->Cisco	Finisar JDSU Pro-Curve	984	300	N/A
		328	100	N/A
		269	82	N/A
		108.3	33	N/A

Type	Maximum Fiber Length			
		82	25	N/A
		32.8	10	N/A
		16.4	5	N/A
		9.84	3	N/A
		3.28	1	N/A

A.5   1 GbE Ports (Management)

Use modular, RJ-45, straight-through UTP cables to connect the 10/100/1000 Fast Ethernet ports to external switches and routers. Use modular, RJ-45 cross-connect cables to connect to end systems.

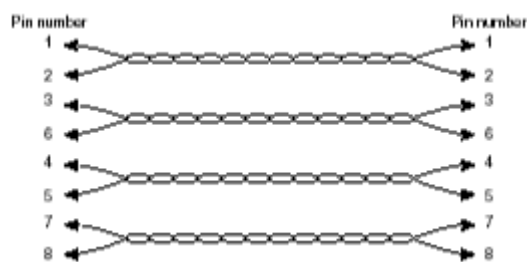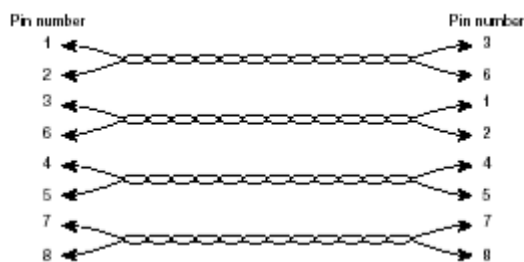**Figure 22: Straight-through Cables**

Figure 23: Cross-connect Cables

The 10/100/1000 Fast Ethernet port supports a RJ-45 connector.